Saint Anthony Elevator No. 3
620 Malcolm Avenue Southeast
Minneapolis
Hennepin County
Minnesota

HAER No. MN-57

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Rocky Mountain Regional Office
Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD
SAINT ANTHONY ELEVATOR NO. 3

Location:	620 Malcolm Avenue, S.E.; Minneapolis, Hennepin County, Minnesota
UTM:	15.483280.4980020
Quad:	St. Paul West, Minnesota
Date of Construction:	1901-1902
Present Owner:	Carl Bolander & Sons, Minneapolis, Minnesota.
Present Use:	Razed
Significance:	Saint Anthony Elevator No. 3 was one of the first grain elevators to incorporate an influential system of tile construction patented by Ernest V. Johnson and James L. Record. The structure also is significant as the work of the Barnett and Record Company, a nationally prominent Minneapolis firm that pioneered in the development of tile-elevator construction. For many years after its erection, Saint Anthony Elevator No. 3 functioned as a "captive" elevator for the Washburn-Crosby Company of Minneapolis, one of the city's largest flour milling concerns. In that capacity, it was an integral element in the grain supply network for the Minneapolis flour milling industry.
Historians:	Robert M. Frame III and Jeffrey A. Hess, November 1992

HISTORY OF THE SAINT ANTHONY ELEVATOR COMPANY

The Saint Anthony Elevator Company was incorporated in Minnesota in April 1886 for "the erection and maintenance of an elevator or elevators for the storage of wheat and other cereals and their products and the purchase, sale, storage, handling and shipment of such cereals and their products." The place of business was Minneapolis and the firm was capitalized at $200,000 with a debt limit of $100,000. The original incorporators, who also comprised the first board of directors, were Frank H. Peavey, William Hood Dunwoody, John Crosby, Charles J. Martin, and Theodore B. Casey.[1]

Three of the incorporators had been important early associates of Cadwallader C. ("C.C.") Washburn and his Minneapolis milling business. C.C. died in 1882, but the three associates continued as major figures in the flour-milling firm that C.C. had founded: the Washburn Mill Company, later Washburn-Crosby Company and, later still, General Mills, Inc. In fact, the Saint Anthony Elevator Company was identified as being allied with the Washburn milling interests and was considered necessary as part of the larger grain supply network for the giant Minneapolis mills.[2]

John Crosby (1829-1887), like Washburn, was born and raised in Maine and had married a sister of Mrs. William Drew ("W.D.") Washburn, Cadwallader's sister-in-law. On the recommendation of his brother-in-law, W.D. Washburn, Crosby came to Minneapolis in 1877

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[1] St. Anthony Elevator Co., Articles of Incorporation, 1886, in Office of Secretary of State, Minnesota State Office Building, St. Paul.

[2] "Fire Proof Storage: Modern Elevator Plant of the St. Anthony Elevator Co. at Minneapolis," Northwestern Miller 54 (September 24, 1902): 626.

to join C.C. in the milling business. Crosby died the year following the incorporation of the elevator company.[3] William Hood Dunwoody (1841-1914) had learned the flour trade in Philadelphia. In 1871 he also came to Minneapolis, first becoming a partner in other milling firms and, later, joining C.C., who sent him to England to open markets for the company's flour. By the late 1880s he had become vice president of the Washburn-Crosby Company.[4] Charles Martin (1842-1910), originally from New York State, had long been C.C.'s companion and was his aide in the Civil War. He came to Minnesota in 1874 as C.C.'s business partner, serving as secretary and treasurer of Washburn-Crosby.[5]

Frank H. Peavey (1850-1901), another Maine native, had arrived in Minneapolis from Maine only two years before incorporation.[6] He would go on to a significant career in the grain elevator business, including the construction (with Charles F. Haglin) in 1899 of the world's first circular, reinforced-concrete elevator.[7] The last of the incorporators, Theodore Casey, was the president of Northwestern National Bank in Minneapolis.[8]

In December 1886, less than a year after incorporation, the board amended the Articles

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[3] James Gray, Business without Boundaries: The Story of General Mills (Minneapolis: University of Minnesota Press, 1954), 32-33; Warren Upham, Minnesota Biographies 1655-1912, Collections of the Minnesota Historical Society, vol. 14 (St. Paul: Minnesota Historical Society, 1912), 152.

[4] Gray, 32.

[5] Upham, 490-91; Gray, 44.

[6] Upham, 584-85.

[7] Ruth J. Heffelfinger, "Experiment in Concrete: A Pioneer Venture in Grain Storage," Minnesota History 37 (March 1960): 14-18; and Reyner Banham, A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture, 1900-1925 (Cambridge: MIT Press, 1986), 137-41.

[8] Minneapolis City Directory, 1886-87, 205.

of Incorporation to increase the capital to $240,000 and raise the debt limit to $500,000.[9] The increases were financial preparation for the 1888 construction of the company's first--and structurally most imposing--elevator, the Saint Anthony Elevator No. 1. This massive, wood-cribbed, iron-clad terminal elevator had a combined working-house-and-annex bin capacity of about 1,400,000 bushels.[10] The giant stood until 1982, when it was razed following damage caused by a tornado. It was among the last of the great wooden terminal elevators in Minneapolis.[11]

The Articles of Incorporation were amended again in 1891 to increase the capital stock to $300,000 and the debt limit was raised to one million dollars. The amendment was signed by Secretary Charles J. Martin and by President Lester R. Brooks (1847-1902), a new officer, who was involved in the Minneapolis grain elevator business.[12] This increase allowed the construction of St. Anthony Elevator No. 2 in 1892.[13]

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[9] St. Anthony Elevator Co., Amendment to Articles of Incorporation, 1886, Office of Secretary of State, State of Minnesota.

[10] The No. 1 working house was 47 x 70 ft. and about 120 ft. high; its internal bins had a capacity of 200,000 bushels. The wood-cribbed bin "annex" was 70 x 400 ft. and 70 ft. high to the bin tops; its 132 bins had a capacity of about 1,200,200 bushels. The annex cribbing used 2 x 12, 2 x 10, and 2 x 6-inch white pine. See Appraisal Service Company, "Appraisal: Minneapolis Terminal, Division of F.H. Peavey and Company, Minneapolis, Minnesota," 1961, 1-47, in St. Anthony Elevator No. 3 Collection, Minnesota Historical Society.

[11] "The Grain Handling Facilities of Minneapolis," Grain Dealers Journal (September 25, 1920), supplement insert; see notes and photographs of tornado damage and subsequent demolition, in Saint Anthony Elevator No. 3 Collection.

[12] St. Anthony Elevator Co., Amendment to Articles of Incorporation, 1891, Office of Secretary of State, State of Minnesota; Upham, 79-80. In the 1891 Minneapolis city directory, Brooks is listed as president of Brooks Elevator Co., Brooks-Griffith Co., and the St. Anthony Elevator Co.

[13] Elevator No. 2 was a wood-frame, metal-clad combined elevator and working house, 58 x 130 feet and 122 feet high, with a bin capacity of 300,000 bushels. See Appraisal Service Company, "Appraisal: Minneapolis Terminal," 1961, 48-92; "St. Anthony Elevators," in Sanborn Map Co., Insurance Maps of Minneapolis,

Brooks and Martin, as vice-president and secretary respectively, signed the next amendment in 1901, resolving that the capital stock should be increased to $500,000 and the debt limit raised to three million dollars. This was in preparation for the erection of the third and last of the Saint Anthony elevators, Elevator No. 3, which reportedly was "controlled and used by the Washburn-Crosby company."[14] At this time the firm's officers were W.H. Dunwoody, president; John Washburn (C.C.'s nephew), vice president; and Charles Martin, secretary. The company manager was W.G. Ainsworth.[15] The general assortment of company officers remained in the Washburn-Crosby family until the St. Anthony Elevator Company was legally dissolved on June 17, 1925.[16]

Following the demise of the St. Anthony Elevator Company, the complex became the property of F.H. Peavey and Company and, subsequently, the Peavey Division of the Van Dusen Harrington Company, Minneapolis. About 1976 the complex was sold to the International Minerals and Chemical Corporation, Minneapolis, which razed Elevator No. 2 and converted Elevator No. 3 to a potash storage facility. It continued under the same ownership and function

Minnesota, Vol. 8 (New York: Sanborn Map Co., 1912, 1940), 950. The roster of officers remained the same until 1896, when Dunwoody became president; Brooks, vice president; and Martin, secretary-treasurer.

[14] "Tile Tank Elevator," Minneapolis Journal, April 4, 1901, 1. In 1917, the debt limit was raised from three million to five million dollars, the last such increase during the company's lifetime. See Amendments to Articles of Incorporation, 1901 and 1917, Office of Secretary of State, State of Minnesota.

[15] "Fire-Proof Storage"; this roster of officers was listed in the Minneapolis city directory for 1902.

[16] See State of Minnesota, County of Hennepin, 4th Judicial Dist. Court, In the Matter of the Voluntary Dissolution of the St. Anthony Elevator Company, a Corporation; Judgment, June 17, 1925; Item No. 239362; included with St. Anthony Elevator Co., Amendments to Articles of Incorporation, Office of Secretary of State, State of Minnesota. Among the other individuals who became officers were Benjamin S. Bull, who also was treasurer of Washburn-Crosby, and Harold O. Hunt, J.A. Mull, and G.F. Burwell, whose occupations are unknown.

until sold in 1991 to Carl Bolander and Sons. Bolander terminated all storage functions at the site, which now included only Elevator No. 3, badly deteriorated from the corrosive action of the potash on the structure. At the end of 1991 Bolander requested a demolition permit from the City of Minneapolis. Although the property was not on the National Register of Historic Places, the staff of the Minneapolis Heritage Preservation Commission believed that it was eligible for the Register. Through informal negotiations with Bolander executives, an agreement was reached whereby the owner would support minimal recordation for the Historic American Engineering Record. The on-site documentation was completed early in 1992 by Jeffrey A. Hess and Robert M. Frame III. St. Anthony Elevator No. 3 was razed during the late winter and early spring of 1992.

MIDWAY ELEVATOR DISTRICT

The St. Anthony Elevator Company elevators were erected in what was then becoming known as the "Midway District" of Minneapolis and St. Paul, so named because of its central location along an east-west axis between the cities (see Figure 1). As historian Henry A. Castle stated in 1912, "If the dual cities are indeed the pillars of the 'Gateway of the Northwest,' the Midway district may well be regarded as the keystone of the arch which connects them."[17] The Midway area became particularly important as an industrial district served by its own rail company, the Minnesota Transfer Railway. The area's development was prompted by growing industrial and rail-terminal congestion in the two downtown areas in the late 19th century. The

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[17] Henry A. Castle, History of St. Paul and Vicinity (Chicago and New York: Lewis Publishing Co., 1912), 622.

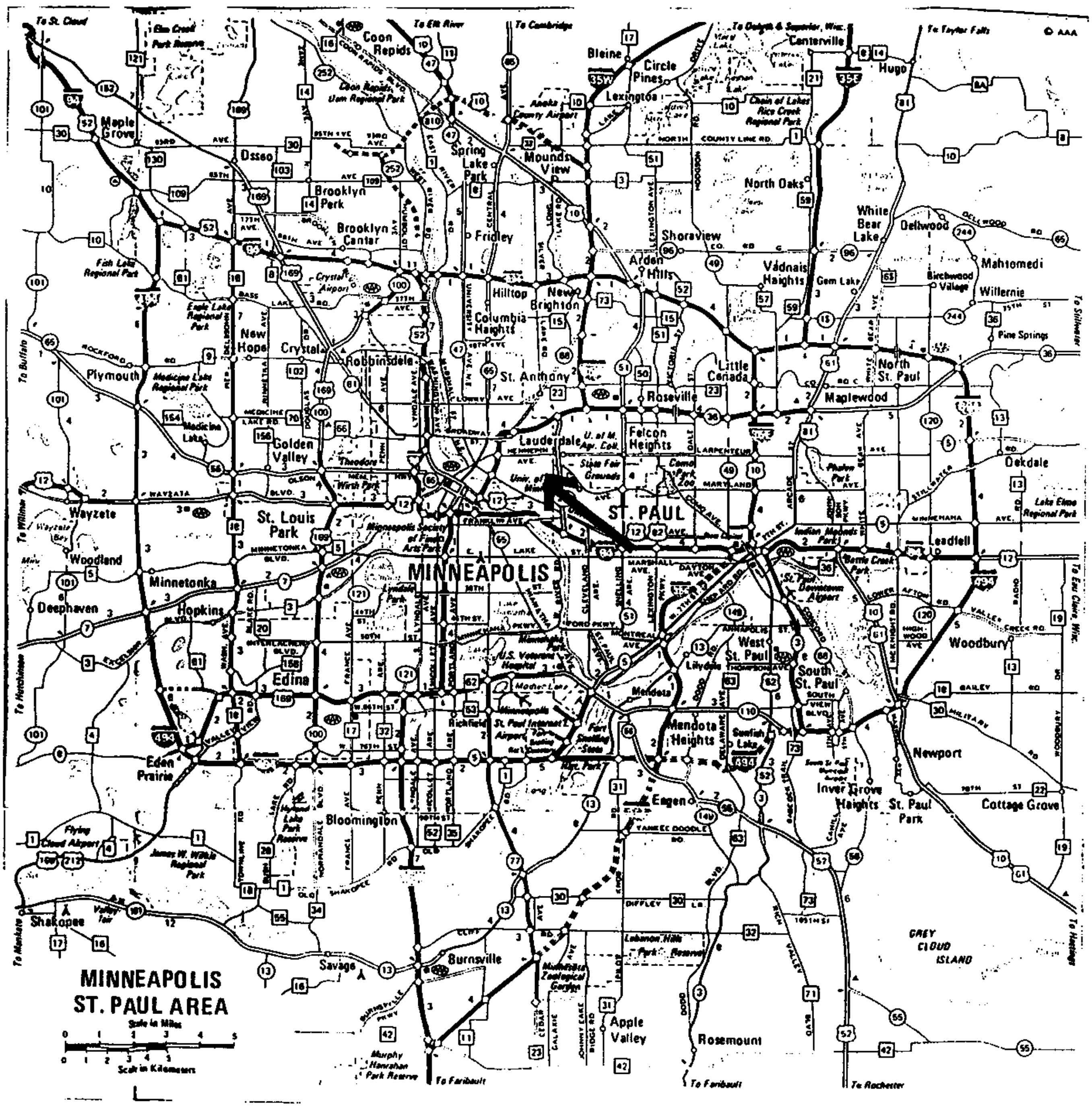

Figure 1. General location of St. Anthony Elevator No. 3 (see arrow). (Source: American Automobile Association map of Minnesota and Wisconsin, 1985.)

nine railroad companies entering the cities joined about 1890 to develop a transfer and switching zone with a connecting belt line railroad between the cities. Not only did the area have excellent freight-handling service with free switching to the nine roads, it also provided cheaper land than at the city centers, with a surface layer of gravel considered suitable for building purposes, and room for expansion.[18]

The western, or Minneapolis, section of the Midway District (between Highway 280 and the University of Minnesota) became in the 1890s the location of a significant number of very large terminal grain elevators. The three St. Anthony elevators occupied an elongated east-west site at the eastern end of this elevator district, within the City of Minneapolis and just west of the general center of the larger Midway District. This area continued as a major grain storage district into the mid-1970s, when it boasted the largest terminal-elevator capacity in the United States.[19]

GRAIN-ELEVATOR TYPE: THE TERMINAL ELEVATOR[20]

Terminal Elevator Type

All three elevators built by the St. Anthony Elevator Company at its Midway District site

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[18] Harold F. Chapin, "A Unique Industrial Center: the Midway District of St. Paul and Minneapolis," American City 16 (January 1917): 20.

[19] According to mid-1970s statistics from the U.S. Department of Agriculture, the Twin Cities had 150,000,000 bushels of capacity, which was almost ten percent of the nation's terminal-elevator capacity. See discussion in Pete Pachin, "Economic Analysis," 1-2, Exhibit in Newcombe & Hansen Appraisals, Inc., "Appraisal: St. Anthony Elevators Number One, Two and Three, Minneapolis, Minnesota," March 1976, St. Anthony Elevator No. 3 papers, Minnesota Historical Society.

[20] The following discussion of grain-elevator type, design, and construction is adapted from Robert M. Frame III, "Grain Elevators in Minnesota," National Register of Historic Places, Multiple Property Documentation Form, September 30, 1989, State Historic Preservation Office, Minnesota Historical Society.

in Minneapolis are "terminal" elevators, the largest and most complicated of all grain elevator functional types.[21] The primary purpose of the terminal elevator is to store grain between its production and its consumption. A second function is the improvement of grain quality, through drying, cleaning, washing, separating, and sizing. A third function serves the marketing process, largely by receiving and holding grain for which there is no immediate need, thus equalizing supply and demand. Another aspect of this third function is facilitating the transfer of grain from one mode of transportation to another.

The St. Anthony elevators collectively fulfilled all three terminal-elevator functions, although they did so largely as the captive of a single milling enterprise. In that regard, the elevators assumed to a degree the function of a "receiving" elevator, which is dedicated to holding grain for a designated processor.

Location

Like most terminal elevators, the St. Anthony elevators were located in a "terminal market" (i.e., at a major transfer hub such as a large rail center). Usually terminal markets are in the path of grain flow from producing to consuming areas. Minneapolis, and particularly the Midway District, has long been such a terminal market, serving the St. Anthony Falls flour mills.

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[21] Grain elevators can be divided into two major functional types, "country" elevator (in Canada, a "primary" elevator) and terminal elevator, and three more specialized types: receiving elevator, transfer elevator, and cleaning elevator.

Capacity

Terminal elevators are the largest of all elevators, ranging generally from 100,000 bushels to the 7,000,000-bushel Saskatchewan Pool Terminal No 7, the largest elevator when built in 1928. The St. Anthony Elevator Co. capacities were: No. 1, 1,500,000 bushels; No. 2, 280,000 bushels; and No. 3, 2,110,000 bushels; for a combined complex capacity of almost 4 million bushels.

Functional Arrangement

Terminal elevators can be constructed in several arrangements of the basic functional units: storage bins, working house, and conveyor and distributing system. The earliest elevators arranged their bins around a central, gravity distribution system. To increase capacity, a second generation employed a horizontal conveyor system extending out from the working house and over a larger set of bins. A variation on this type, and an arrangement employed in St. Anthony Elevator No. 3, involves separating the working house and its elevating system from the storage bins.

Structural Materials

Grain elevators in general, and terminal elevators in particular, have been constructed of one or more of the following basic materials: wood, steel, concrete, brick, and tile. The history of the use of these materials in elevator construction is important to understanding the significance of St. Anthony Elevator No. 3.

Until the mid- and late-1890s, the standard material for all grain elevators was wood.

Earlier and smaller wooden elevators built in a conventional balloon-frame design were known as "studded" elevators. This was not a particularly strong method of construction, and it was superseded by the "cribbed" system, which involved wooden planks laid flat in a rectangle or square, overlapping at the corners in "log cabin" fashion. St. Anthony elevators No. 1 and No. 2 were wood-cribbed elevators.

Increasingly, during the 1890s and after, wood construction was replaced by steel, tile, brick, and concrete, because of their fireproof qualities. The first choice in the 1890s was steel, but engineers had difficulty in developing a steel design with adequate rigidity. The solution, created largely in Minneapolis, was found in tile and reinforced concrete. The competition among the materials was short-lived, with reinforced concrete emerging as the clear victor in the early years of the 20th century. The story of tile construction, however, is an important chapter in the evolution of elevator design.

The major system for building grain elevators in tile was developed and patented by Ernest V. Johnson, son of early iron-elevator builder George H. Johnson, in collaboration with Minneapolis elevator builder James L. Record of the Barnett and Record Co. In the 1890s Johnson experimented with hollow burned clay building tiles and, with James L. Record, was granted a series of patents beginning in 1895. In 1899 a single test tank was constructed in Minneapolis on the Osborne-McMillan Elevator Company property. Following the successful completion of the experiment in early 1900, the system was turned over to the Barnett and

Record firm in Minneapolis.[22]

The Johnson-Record system initially employed a complicated form, which it soon simplified. The system has been described by Reyner Banham as follows:

"[It] employed a single-leaf structural wall made of alternating courses of short and tall tiles; the short ones were hollow troughs into which the steel reinforcing rings were laid and then grouted down solid. Early versions of the simplified system apparently had a layer of glazed tiles lining the inner face of the wall to protect the grain or to prevent it from catching during discharge, but this was deemed unnecessary and these 'furring' tiles were transferred to the outer face of the wall to protect the main structure against damage by external fire and weather."[23]

Barnett and Record quickly built a string of elevators using the patented system, including the 1901 St. Anthony No. 3 in the Minneapolis Midway elevator district and the 1903 Washburn Crosby elevator in Buffalo, N.Y. The Buffalo elevator remains extant in 1992, as does the Pillsbury "A" Mill tile elevator, completed by Barnett and Record in 1909, but whether the Pillsbury example also follows the same early patents is not clear.[24]

In a relatively short period of time, tile engineering was eclipsed by the introduction of reinforced concrete, which first appeared in the same city, Minneapolis, at exactly the same

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[22] Johnson's patents and experiments are discussed in "Fire-proof Grain Storage Buildings," The Brickbuilder 11 (November 1902): 232-36, published immediately after several of the earliest Johnson-Record elevators were completed; in Milo S. Ketchum, The Design of Walls, Bins and Grain Elevators, 3rd ed., rev. and enlarged (New York: McGraw-Hill Book Company), 384-85; and in Banham, 133-37.

[23] Banham, 134. Another tile system was reported by Milo Ketchum, the Witherspoon-Englar Tile Grain Bin. In Ketchum's volume is a diagram showing a system similar to that of Johnson-Record, but simpler--a double-wall tile arrangement, also with steel tension bands grouted in place, in a troughed tile layer. See Ketchum, 385. In 1919 a tile system termed the "Preston Lansing Tile Grain Bin," employing "ship-lap" joined blocks, was promoted by the J.M. Preston Company of Lansing, Michigan. See the J.M. Preston Company advertisement in Grain Dealers Journal [hereafter GDJ], 43 (October 10, 1919): 600.

[24] On the Washburn-Crosby tile elevator in Buffalo, see Banham, 144-53. On the Pillsbury tile elevator in Minneapolis, see "Pillsbury Mill 'A' Elevator," American Elevator and Grain Trade [hereafter AEGT] 29 (July 15, 1910): 9.

time, with the 1899-1900 construction of the Peavey-Haglin experimental concrete bin.[25] Tile elevators, nevertheless, continued to be built for many years. Barnett and Record erected a large, 700,000-bushel tile elevator for Peavey Company in Duluth in 1907. One of the most significant Minneapolis tile examples is the 400,000-bushel Pillsbury A Mill Receiving Elevator noted above, built in 1908-09 by Barnett and Record.[26]

In 1903, the Northwestern Miller declared that "tile, next to steel, has the requisite strength and lightness and is bound to win favor. . . ."[27] By the mid-1920s, however, the Grain Dealers Journal was reporting that "tile tanks are no longer used in the construction of large terminal storage plants, [but] we occasionally hear of one being erected at a country point . . . ." The Journal was skeptical of country elevator construction in tile, and attributed its continued use to "the seductive arguments of the tile salesman."[28] Through the remainder of the 1920s, the Journal continued to announce tile-elevator failures caused by collapse or fire.[29] In 1942 a new patented tile was announced, developed by the Fairchild Clay Products Company,

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[25] See Heffelfinger, 14-18, and Banham, 137-41.

[26] The Peavey elevator in Duluth is discussed in Charles Schmucker Clark, ed., Plans of Grain Elevators, 3rd ed. (Chicago: Grain Dealers Journal, 1913), 48-49; the Pillsbury tile elevator is discussed in "Pillsbury Mill 'A' Elevator," AEGT 29 (July 15, 1910): 9.

[27] E.P. Overmire, "Modern Fireproof Grain Elevators," Part 2, Northwestern Miller 56 (November 25, 1903): 1155.

[28] "Another Tile Failure," GDJ 55 (August 10, 1925): 160.

[29] See "Another Tile Failure," GDJ 55 (August 25, 1925): 226; "Collapse of Another Tile Tank," GDJ 56 (May 10, 1926): 525; "Tile Tanks Are Not Fireproof," GDJ 56 (May 25, 1926): 614; "More Tile Tanks at Saxman, Kansas, Collapse," GDJ 57 (August 10, 1926): 163; C.W. Gustafson, "Tile and Wood: Storage Tanks Combining Them, Often Go Up in Smoke," AEGT 48 (April 15, 1930): 598; "Metal Sheathing a Tile Tank," Grain and Feed Journals Consolidated [hereafter GFJC] 75 (December 11, 1935): 467; and "Iron Siding on Tile Tank," GFJC 76 (May 10, 1936): 375.

and employed in several Kansas and Nebraska elevators. It is not known if the 1942 patent produced many elevators or if any Minnesota elevators used it.[30]

Aside from the criticisms about structural instability and lack of true fireproofing leveled against tile in the 1920s, a clear disadvantage almost from the beginning was tile's inflexibility in bin size, since size was limited to tile manufactured in predetermined radii. Tile was strong enough for grain storage only in cylindrical form, where it was indeed light, a major advantage. It "no doubt will find favor," declared J. MacDonald in 1902, "particularly in those cases where the business to be transacted in the elevator will permit the use of large storage compartments."[31] But large bins were not particularly useful in country elevators, especially large round bins, which were a poor fit in a compact house usually intended to be designed and built as economically as possible.[32] An additional criticism, as stated by A.E. Macdonald, was that "tile construction was also slow and it was difficult to keep such construction watertight, the rain coming in at the joints between the tiles."[33]

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[30] "Tile Stages a Come-Back," GFJC 89 (September 9, 1942): 191.

[31] James MacDonald, "Fireproof Grain Elevator Construction," Journal of the Western Society of Engineers 7 (February 1902): 36-56.

[32] See "Which is Better, a Concrete or Hollow Tile Elevator," GDJ 46 (May 10, 1921): 764-65.

[33] Albert E. Macdonald, "Grain Elevator Design and Construction--Part 1," Contract Record and Engineering Review 43 (January 16, 1929): 47-51.

THE BUILDERS: BARNETT AND RECORD COMPANY[34]

St. Anthony Elevator No. 3 was built by the Barnett and Record Company of Minneapolis. The firm was named for its founders, Lewis C. Barnett (1848-1936) and James Lucius Record (1857-1944). Born in Kentucky, Barnett graduated from Iowa State University and about 1870 went into the grain trade in northern Iowa. He acquired the rights to a round elevator design and, in 1881, moved to Minneapolis as a builder specializing in this type. He formed a partnership with James L. Record in 1885. Record was born in Vermont, the son of a building contractor. During his late teens and early twenties he lived in Lake City, Minnesota, and La Crosse, Wisconsin, learning carpentry and contracting. He moved to Minneapolis in 1881, becoming an employee in Barnett's contracting firm and, subsequently, Barnett's partner.

In 1892 Barnett and Record incorporated their firm as a "general contracting, building and mechanical engineering business," operating in Minneapolis. The company built many large elevators in the Twin Cities and Duluth-Superior area. They also reportedly built the mines and mining building at the 1893 Columbian Exposition in Chicago. The two remained partners until 1902, when Record joined with Lewis S. and George N. Gillette to found the Minneapolis Steel and Machinery Company. Barnett continued the firm, but with new partners; he retired about 1916 and died on May 18, 1936, in Washington, D.C. Record's new firm eventually became

[34] This discussion of the Barnett and Record Company is derived from the following sources: "Lewis C. Barnett," Northwestern Miller, 36 (August 24, 1893): 264; "Louis [sic] C. Barnett, Building Pioneer in State, Is Dead," Minneapolis Journal, May 19, 1936; "James Lucius Record," National Cyclopaedia of American Biography, Vol. 34 (New York: James T. White & Co., 1948): 352-53.; "J.L. Record of M.-M. Dies," Minneapolis Star Journal, March 3, 1944; "James Record M-M Head Dies," Minneapolis Morning Tribune, March 3, 1944; and Barnett and Record Company, Articles of Incorporation, January 11, 1892, filed for record January 15, 1892, Office of Secretary of State, State of Minnesota.

the Minneapolis-Moline Company, of which he was board chairman when he died on March 2, 1944, in Minneapolis.

DESCRIPTION OF THE SAINT ANTHONY ELEVATOR NO. 3

St. Anthony Elevator No. 3 is situated at the west end of the St. Anthony Elevator Company site, which is located between the north end of Malcolm Avenue and the south edge of the east-west Burlington Northern (formerly Great Northern) rail lines. Although some components were customarily referred to as individual buildings, the elevator is best conceptualized as a single extended structure with interconnecting conveyors, walkways, and tunnels (see Figure 2).

St. Anthony Elevator No. 3 was built in two phases in accordance with drawings dated 1901-02.[35] An original tile plaque, mounted on a bin wall, identified the patents used by Barnett and Record in the design and construction as "No. 595,391, Dec. 14, 1897; Nos. 664,323, 664,324, and 664,325, all Dec. 18. 1900; No. 692,544, Feb. 4, 1902; and No. 713,104, Nov. 11, 1902."[36] The initial 1901 construction included the working house and engine room and eleven tile bins. In 1902, four identical tile bins were added. About 1947-48 a grain dryer building was constructed a short distance south of the working house, and about 1982 a truck scale and shed were constructed between the working house and the dryer building.

[35] Many, but not all, of the original ink-on-linen drawings are preserved in "Peavey Elevators, St. Anthony Fire Proof Elevator, Minneapolis, MN, Barnett & Record, 1901-1902," Collection No. N75, Northwest Architectural Archives, University of Minnesota, Minneapolis.

[36] When St. Anthony Elevator No. 3 was razed in spring 1992, the tile plaque was removed and added to the museum collections of the Minnesota Historical Society in St. Paul. An identical plaque (although in deteriorated condition) is mounted on the extant 1903 Washburn-Crosby tile elevator in Buffalo, N.Y.

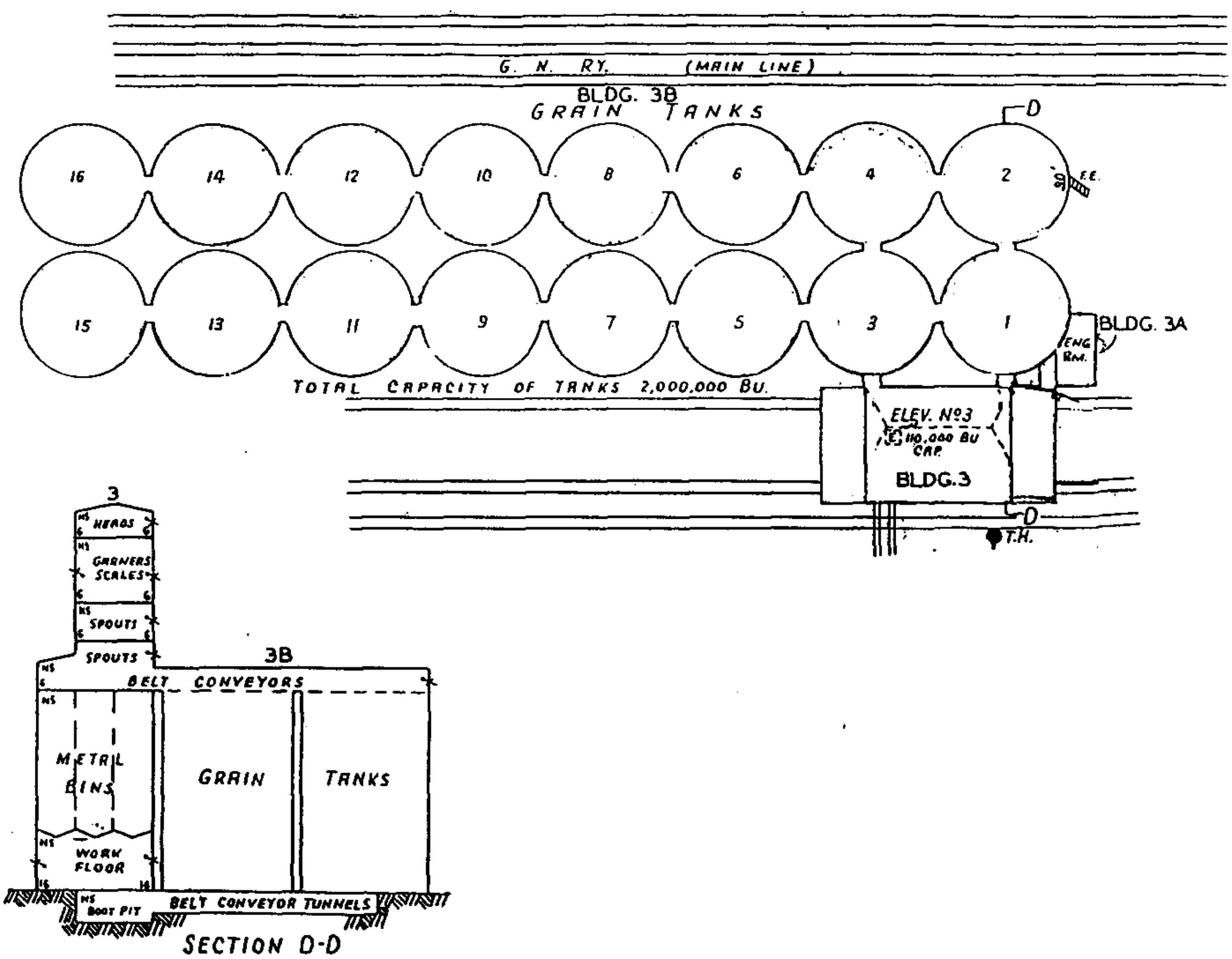

Figure 2. Plan and section views of St. Anthony Elevator No. 3, 1912. (Source: "St. Anthony Elevators," in Insurance Maps of Minneapolis, Minnesota, vol. 8, New York: Sanborn Map Company, 1912.)

St. Anthony Elevator No. 2 originally was located directly south of the working house for No. 3. St. Anthony Elevator No. 1, the massive wood-cribbed elevator, originally was built on an east-west axis and east of Nos. 2 and 3. Both Nos. 1 and 2 elevators were razed before No. 3 was demolished in 1992.

Grain Tanks

The grain "tanks" (as the bins were termed locally) were arranged on an east-west axis, parallel to the rail lines, in two rows of eight tanks each, with a 3-ft. space between tanks both ways. The north tanks had even numbers (2 through 16) and the south tanks had odd numbers (1-15). The 1902 added bins were nos. 13-16, on the west end. On fire insurance maps of the complex, the tanks are collectively identified as "Building 3B." The working house, situated adjacent to tanks 1 and 3, is identified on the maps as "Building 3." Building 3A is the engine room, which was situated at the northeast corner of the working house, abutting tank 1.

According to the original drawings, the 16 grain tanks were virtually identical. Each was 50 ft. in diameter outside (48 ft., 6 ins. diameter inside); 78 ft. high from the exterior, native-limestone rubble foundation-ring to the top of the interior bin space (indicated on the exterior wall by a molding). The exterior tank wall rose an additional 9 ft., 4 ins. to accommodate the conveyor-gallery bridges that extended through the tops of the tanks. This gallery bridge was completely open to the tank interior. Such an interior gallery was very unusual, since overhead galleries in almost all other elevators are above and outside the bins. The gallery bridges were metal Pratt trusses of 50-ft. span, each with a channel-section bottom chord, angle-section top chord, and angle-section diagonals. The tank roof was a flattened cone constructed of book-tile and concrete on a steel-truss support.

The inside bottom of the tank was slightly hoppered to feed spouts that unloaded onto the lower conveyors that traveled beneath each tank row. Each lower conveyor was located in a limestone-masonry tunnel that was 6 ft., 6 ins. high and 7 ft. wide. The two tunnels could be entered either by a doorway at the west end of each tank row, or from the transverse conveyor tunnels that connected the below-tank conveyors with the elevator pits beneath the working house.

The most significant feature of the grain tanks was the wall construction, designed and erected in conformance with the patents cited on the Barnett and Record plaque as noted above (see Figure 3). The interior structural tile wall had alternating courses of channeled tiles (6 x 12 x 4 ins., laid with the longitudinal trough facing up, in a "U" configuration) and load-bearing hollow tiles (12 x 6 x 12 ins.). Mortared into the channels were "bands" of steel bars set on edge, following the circumference of the tank. This arrangement was first established in Ernest Johnson's 1900 Patent No. 664,325. (In his 1902 Patent No. 713,104, Johnson noted that a single bar would be preferable for one band, but that a single bar of such a length probably was not available commercially; therefore, a series of bars would suffice.) The bars were not connected at the ends but simply were lapped in the channel. The recommended lap was four feet. Because of the continuous mortaring in the channels, Johnson considered the bars to be anchored "at every point of their length in the cement and to the wall, and thus afford great tensile strength" to counter outward pressure (Patent No. 664,325).

According to the 1902 Barnett and Record drawings, the number of bands, and

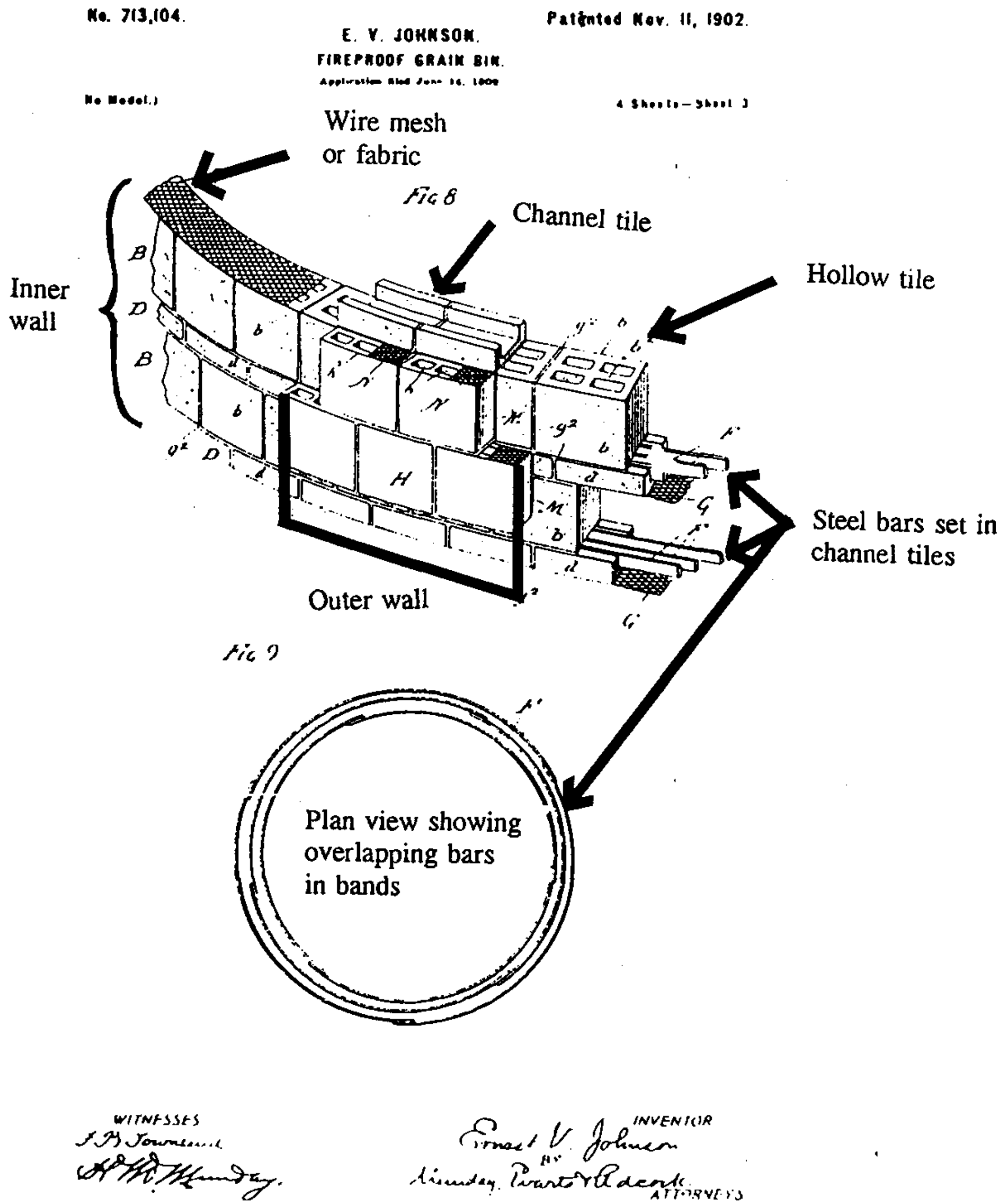

Figure 3. Plan view and cutaway view of patented tile wall construction for the grain bins of St. Anthony Elevator No. 3. (Source: Patent No. 713,104, Fireproof Grain-Bin, Ernest V. Johnson, Chicago, Ill., filed 14 June 1902, serial No. 111,599.)

dimensions of bars, would progressively decrease as the bin height increased (and potential internal stresses decreased in proportion). For example, each course of the bottom ten courses of channel tile included three bands. Two of those bands were each comprised of 3 bars, 2 ins. x 7/16 ins. x 55 ft., 6 ins.; the third band was made of 3 bars, 2 ins. x 1/2 in. x 55 ft., 6 ins. The courses continued through nine separate sets until the top three courses, each of which contained a single band made of 3 bars that were 2 ins. x 1/8 in. x 52 ft. and 1 bar that was 2 ins. x 1/8 in. x 20 ft.[37] Judging from the 1902 drawing of the "distribution of bars," the arrangement was not identical in all tanks, with some tanks having a more complex series of changes at the mid and upper levels; the drawing, however, does not indicate which tanks had which arrangement and why.

The patent descriptions indicated that a single layer of quarter-inch wire-mesh or metal fabric was to be laid between the bottom of each channel tile and the top of the hollow tile, to insure "proper bedding" and "perfect joints" between the tiles. A layer of glazed furring or "facing" tiles (2 x 12 x 12 ins.) was laid on the exterior of the channel/hollow-tile wall, with a waterproof cement-mortar facing between the two layers. Each tank was equipped with an 18 x 12-in., cast-iron clean-out door near the tank bottom.

Working House

Situated adjacent to tanks nos. 1 and 3 was Building No. 3, the working house. The working house was a combination brick, tile, and steel-frame structure. The ground-floor was

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[37] This is similar in theory to wood-cribbed construction, where the dimensions of the flat-laid planks diminish as the bin height increases; for example, the lowest ten feet of bin may be constructed of 2 x 10-in. planks, the next ten feet of 2 x 8 planks, the next of 2 x 6 planks, and so on.

47 x 94 ft. and included the scale and track-shed area. From the ground floor to the 75-ft. level, the working house was nominally 45 x 60 ft., arranged 15-ft. bays. From the 75-ft. level to the peak of the tile roof at 154 ft., 8 ins., the working house was nominally 30 x 60 ft.

The structural framework was steel, sheathed in tile, except for the bottom level (to a height of 24.5 ft.), which had Chaska-brick walls. The first-level bays were inset with corbelled brick. The south windows were originally 12-over-12 double-hung sash. The east and west (three bays) facades included two 13 x 18-ft. doorways for railroad tracks. The east and west facades had stepped parapet walls.[38]

Adjacent to, and immediately to the northeast of the working house was the one-story, brick engine room, a 15 x 30-ft., 14-ft.-high appendage that was architecturally integrated with the working house. The three-bay engine room originally included a doorway centered between two 6-over-6 double-hung sash. It housed a 200-hp. steam engine that received steam via an overhead pipe from a boiler-and-utility-building situated about 120 ft. to the northeast. In 1992 the engine house was vacant.

The top (sixth) story of the working house was the elevator head floor, measuring 13 ft., 8 in. to the peak of the tile roof. It housed the upper power shafts and elevator heads for the two elevator legs. Here grain picked up in the pits below the working-house floor was dumped out.

The fifth story, with a ceiling height of 27 ft., was the scale floor. It housed two

[38] After the elevator's purchase by International Minerals and Chemical Corporation in the 1970s, the working house walls were reinforced by adding vertical steel bars on the exterior walls. The bars were tied together by means of steel cables running horizontally through the working house interior.

1,600-bushel (120,000 pound) Fairbanks hopper scales with their respective garners. The garners were fed from the elevator head above; the scale hoppers emptied into the distributing spouts below. Centered on the north interior wall was the weighmaster's shack.

The fourth story or "spouting floor" was located below the scale hoppers. Its rotating distributing spouts could be directed to a series of spout openings in the floor, which led to various bins and conveyors below. Several of the original spout openings in the floor had been disconnected and were no longer in use. In the southwest corner of this floor was the upper terminus of both the passenger elevator and the spiral staircase that descended to the ground level. At the center of the south wall was the bottom of the spiral stair that ascended to the top level of the working house. Next to this stairway was a door opening onto the bridge that extended south to the Grain Dryer house.

The third story, below the distributors and above the bins, was the "distributing floor." Here grain was directed via flexible spouts to either individual working-house bins or to the two transverse conveyors that transported grain to the north and south longitudinal conveyors running through the tops of the large tile bins. Above the distributing floor, the working house north-south dimension was reduced to approximately 30 ft. Topping the southernmost 15-ft. bay of the distributing floor was a sloping tile roof.

Between the distributing floor and the ground floor was the second-story, 54-ft.-high bin area, containing the 12 working-house bin hoppers. Their dimensions and arrangement fit the 15-ft.-bay module, although the center bins on the east and west were smaller to accommodate the vertical elevator legs, stairway, passenger elevator, and power-transmission equipment. The bins were constructed of riveted, quarter-inch steel plate.

Below the bins was the working-house (ground-level) floor, containing the equipment for loading and emptying rail cars and, later, trucks. The railcars were moved in and out of the shed with a double-drum car-puller. Beneath the working house were the railroad track-dumps and elevator pits (or boots) for the two elevator legs. Grain was dumped into the pits, either from the railcars (originally)[39] or trucks (later) above, or from the transverse conveyors that extended from beneath the tile tanks. Once in the pits or boots, the grain was elevated to the top of the working house, where it could begin its downward journey through the scales and into either the tile tanks for storage or the working-house steel bins for shipment out via truck or rail.

Equipment: Bucket Elevators (vertical travel)

The two bucket elevators in the working house were originally identified as No. 1 Receiving (west leg) and No. 2 Shipping (east leg). Each extended 161 ft. from its boot (pit) in the basement to its head at the sixth story, and each had 323 20 x 7-in. steel cups, mounted on 13-in. centers. Originally there was also a small "ticket elevator" extending from the basement to the fifth story, designed to carry the paper weigh-slips from the weighmaster.

Equipment: Belt Conveyors (horizontal travel)

The elevator was served by a series of 30-in.-wide belt conveyors. The set located in the basement, under the tanks, was the "load-out system"; the set in the overhead galleries at

[39] Originally the elevator was served by railroad boxcars containing grain, and special equipment was installed to empty them. The boxcar doors were forced open with Darden Pool pneumatic car-door openers and the grain was removed with double automatic power grain-shovels. See Appraisal Service Company, "Appraisal," 1961, 310-11.

the third story was the "unloading system," used to fill the tanks. When all three St. Anthony elevators were operating, these belts were numbered as part of an overall sequence; later, No. 3 received its own belt numbers. The systems were as follows:

Basement (load-out) System:

Belt 1 (old 7) ran from Tank 3 to Leg 1 (west);
Belt 2 (old 6) ran from Tank 2 to Leg 2 (east);
Belt 3 (old 10) ran from Tank 15 to Tank 3 (south row);
Belt 4 (old 11) ran from Tank 16 to Tank 2 (north row).

Gallery (fill) System:

Belt 5 (old 9) ran from working house west to Tank 4;
Belt 6 (old 8) ran from working house east to Tank 2;
Belt 7 (old 12) ran from Tank 15 to Tank 1 (south row);
Belt 8 (old 13) ran from Tank 16 to Tank 2 (north row).

Belts 7 and 8 were equipped with Caldwell self-propelling trippers. Belt 6 was equipped with a stationary tripper.

Equipment: Other

All buildings of Elevator No. 3 were served by a dust-collecting system that was disconnected during the time potash was stored. The original system was a Buffalo Forge Company size 40 steel-plate mill exhauster, type MX.

The original power-transmission system included line shafts and rope drives. Most of this system was removed when the elevator was electrified about 1950, but a few parts remained in 1992, including the 100-in.-diameter, 6-groove, cast-iron sheave on the sixth story for the head drive.[40]

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[40] For dust collector specifications, see Appraisal Service Company, "Appraisal," 1961, 275-79; for power-transmission specifications, see 362-66. For additional details on the conversion to electric motors, see the various blueprint drawings prepared in 1949-50 by the electrical contractors, Industrial Electric Company, Minneapolis, Minnesota, for the St. Anthony Elevators' owners, the Peavey Elevator Company, St. Anthony Elevator No. 3 Collection, Minnesota Historical Society.

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